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Intellectual Property on Works of Art Made by Artificial Intelligence

Cláudio Lisboa dos Santos[1], Ângela Rocha Machado[2]

[1]Master's student of the Graduate Program in Intellectual Property and Technology Transfer for Innovation at the Federal University of Bahia, Institute of Chemistry, Salvador, Bahia, Brazil
[2]PhD in Energy and Environment from the Federal University of Bahia, Teacher at the Institute of Health Sciences at the Federal University of Bahia (ICS-UFBA), from the Graduate Program in Intellectual Property and Technology Transfer for Innovation (ProfNIT) Focal Point from the Federal University of Bahia, Salvador, Bahia, Brazil

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Abstract*—*Rembrandt is considered as one of the greatest painters in the history of art in Europe and the world. Artificial Intelligence (AI) has been gaining a field of academic study due to the possibilities of its use in several fields of knowledge. Its application can be in facial recognition, in music composition, art painting, among others. The objective of the work is to verify the ownership of a work of art made by AI based on the traces made by Rembrandt. The methodology research used was qualitative, exploratory and descriptive, bibliographic and case study. AI made a painting with similar characteristics to Rembrandt's works and a doubt arose about the intellectual property of the work. We conclude that because it is a new fact, there is no legislation to support the deed and as intellectual property is related to human invention, it cannot be attributed to the machine.

Keywords*—*Autonomous system, Copyright, Painting, Technology, Rembrandt.

I. INTRODUCTION

Rembrandt was a Dutch painter, engraver and draftsman, considered as one of the greatest artists of all time, mainly from the Baroque period, however, the recognition of his work took place only in the 19th century. The height of his fame and prosperity occurred in 1634. His painting focused on portraying people and the most common themes in his work were sacred themes, group portraits and self-portraits [1, 2].

Intellectual Property (IP) is a vast and very important field for a nation's socioeconomic growth, constituting a public policy that fosters development, stimulates creation and protects knowledge. It also translates into rights aimed at the creator and encourages the transfer of technology [3, 4, 5].

According to the World Intellectual Property Organization (WIPO) the sum of Intellectual Property (IP) rights covers the domains of human activity. IP covers three categories of law, namely: Copyright; Industrial property; and, Sui Generis Protection [5].

Copyright aims to protect works created by the human intellect, which can be artistic, literary or scientific. In Brazil, the legislation dealing with the subject are Laws 9,609 of 1998 and 9,610 of 1998, which have among its principles the non-mandatory registration of the work, as proof can be made through documents, photos or other means. The offices responsible for registering copyright in Brazil are the National Library and the School of Fine Arts [6, 7, 8, 9].

The legislation about computer programs does not conceptualize who is the individual who owns the software or who is the figure of the author, citing only that the owner may be a natural or legal person, recommending the concept of author of the Copyright Law number 9,610 of 1998 [6, 10].

Law 9,610 of 1998 says that the production of artistic works are expressions of human creativity, capable of conversion into private property, moral protection and temporary patrimonial protection, ensuring their financial return. Therefore, for an adequate commercialization process, it is necessary to adequately define who owns the

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intellectual property to be protected, objectively defining the owner of the intangible asset [6, 9, 11].

Innovation is a field that allows for several possibilities of exploration regardless of its field, be it technological or social. Technological development reduces space-time and allows global integration, facilitating the occurrence of immediate interventions and without constituting an obstacle, the distance between the interventionist and the intervention site and this action can be done by humans or by a machine [12, 13].

The Fourth Industrial Revolution was a concept developed by Schwab at the World Economic Forum in 2015, considered from the technological evolution and with the inclusion of emerging technologies such as Artificial Intelligence (AI), digitization, sensing, 3D printing and convergent mechanization in digital, physical and biological technologies. This is also called the third generation of automated systems, autonomous and advanced technologies, which generate products and services, in addition to deciding, acting and creating works of art without depending on human guardianship [14, 15, 16].

Man has always sought to understand human thought for thousands of years, mainly using philosophy and later psychology and neurosciences, trying to create or build intelligent systems or entities [17].

In the past, AI was seen as a technology related to science fiction or something surrealist, later migrating to the cinema and being shown in futuristic films. As time passed, it went through a phase of experiments and then humanity began to use its countless uses. AI is already a reality and is revolutionizing the world, just like the internet, and covers a variety of topics such as general use such as learning, perception and specific tasks such as playing, voice and facial recognition, driving autonomous vehicles, among other activities [16, 17, 18, 19, 20].

Alan Turing and John Von Neumann were the pioneers and creators of the technologies that served as the basis for AI in the 1950s, formalizing the architecture of today's computers. The term Artificial Intelligence was first used in 1956 by John McCarthy at an expert conference realized at Dartmouth College. In 1957, Herbert Simon said that a computer would defeat a human being in a game of chess, which was proven 30 years later [21, 22, 23, 24].

Since the 1950s, AI has been the subject of studies and currently has attracted interest from the academic and scientific community, due to the possibility of its numerous applications, such as in finance, transportation, public service, pharmaceutical industry, medicine, aviation, marketing, among others, mainly due to the technological evolution of computers in the last decades, the need to solve complex problems and perform human activities, with the added benefit of providing productivity gains, improving efficiency and reducing costs [25].

Nowadays AI already has the capacity to insert itself in the matters that are configured in the legislation related to copyright, although that right is intrinsic to an individual or creation of the intellect and not to other beings or things, because the author has to be human. In a certain period, the copyright of a photo was given to a monkey, however, a court revoked that benefit due to the interpretation of the law [9, 26, 27, 28].

Among the objectives of AI, it is possible to mention the interaction between humans and machines, which can also be used to replace human beings in specific tasks. The main research areas of AI are specialist systems, learning, knowledge representation, knowledge acquisition, robotics, distributed artificial intelligence, among others [29, 30].

AI technology has been growing geometrically, since the decade of 2010 its growth has been projected around 60% per year. It is considered as a disruptive innovation. Its application has become common on the internet, serving as a basis for several tools. AI is already being used to produce literary, artistic, musical works, among others, which will impact on the copyright arising from Intellectual Property (IP) in relation to copyright ownership [17].

In the case study, AI was trained with the works of the painter Rembrandt with the aim of making a painting with a similar style and, in the eyes of people who are experts in art, the work could be credited to the painter for presenting all the characteristics inherent to his other works. This condition created doubts about copyright, since the existing legislation attributes creation only to the human intellect, therefore, only individuals have this attribute. For the creation of the work, the AI used algorithms to identify the geometric patterns of the painting, in order to recreate a work that could be characterized as an authentic Rembrandt painting, but without any human contribution in the creative process or originating from the human intellect [13, 15].

The objective of the work is to search for fundamentals about the ownership of works of art, using to achieve this objective, the legal bases and the rules and resolutions of the Brazilian institutions responsible for the registration of intellectual property.

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II. METHODOLOGY

Regarding the method, the research is qualitative [31]. Regarding the objectives, the research is exploratory and descriptive. The research is exploratory because there is not much information about the object of study, application of AI in the production of a work of art. The research is descriptive because it is intended to observe the data, analyze, classify and interpret. The research technique was bibliographic and study of a case, selecting one of the uses of AI, in order to better understand and with greater depth the subject studied [31]. In the data collection, technical procedures were used to do documentary research and the collection of secondary data in websites, magazines, books, academic works and legislation.

The case study aims to deepen the question: who is responsible for the ownership of new artistic works produced by AI? In this way, according to the theoretical foundation, the Industrial Property Law branch is separated - because it is a law on: patents, industrial design, brand, geographical indications and repression of unfair competition – and also moves away from the Sui Generis Protection Law branch - as it is a law on integrated circuit topography, cultivar and traditional knowledge. In relation to Computer Program Copyright, it only applies when it comes to ownership of the software responsible for creating the AI.

III. THEORETICAL FOUNDATION

3.1 REMBRANDT

Rembrandt is considered to be one of the greatest painters of all time. In his painting there is emphasis on lights and shadows and most of his paintings portrayed people, in addition to some self-portraits that varied throughout his life and captured his essence and his spirit. His last painting was done in 1669, in the same year of his death. His works have more than 350 years of creation, therefore, they are not protected by the copyright, and can be copied and used by anyone, as it is a work in the public domain and the patrimonial right no longer exists [1, 2].

The creation of an artist is intertwined with his manual and artistic skills, but his connection concerns the idea in the conception of the work and his creative spirit and this condition will be taken into account when evaluating by specialists, who also takes inspiration into account [10].

3.2 INTELLECTUAL PROPERTY (IP)

New ideas are the principle and seed that cultivates successful economies, however, the idea itself produces little in terms of economic value. The ability to transform a new idea into an innovative product or service and achieve commercialization is what adds value to the innovation process [11].

The flow of innovation goes through the innovative idea initially. A great idea demands certain resources for its achievement and, depending on the amount needed, it may become economically unfeasible, in other words, it is not possible to put it into practice, according to current technologies, and turn it into a product or service with commercial scale production. To achieve the concept of innovation, therefore, the idea must necessarily reach commercialization capacity. As everything starts with the new idea, here is the importance of the World Intellectual Property Organization (WIPO) on an international scale and of the INPI in the Brazilian territory regulating IP.

WIPO defines IP as:

refers to creations of the mind: inventions; literary and artistic works; and symbols, names and images used in commerce. Intellectual property is divided into two categories: Industrial property includes patents for inventions, trademarks, industrial designs and geographical indications. Copyright covers literary works (such as novels, poems and theater), films, music, artistic works (for example, drawings, paintings, photographs and sculptures) and architectural projects. Rights related to copyright include those of performance artists in their presentations, phonogram producers in their recordings and broadcasters in their radio and television programs [5, p. 2].

Article 2 of Law No. 9,279 of 1996, defines Industrial Property as the segment of intellectual property destined at industrial activities aiming at protection for: invention patents; Industrial draw; brand; geographical indications, and; suppression of unfair competition [32].

3.3 ARTIFICIAL INTELLIGENCE (AI)

Artificial Intelligence (AI) is the ability of machines to act in some type of behavior equivalent to human, in the sense of carrying out actions controlled by computers and that to be performed by humans require intelligence, in this case, understanding intelligence as a set of various components, among them creativity. AI has the ability to learn after several training sessions, which allows it to accumulate experiences through attempts at mistakes and successes, so they can make different decisions according to the situation and the existing parameters in their memory [10, 28].

Among the errors attributed to AI, it is possible to mention the case of an internet company that marked black people as gorillas in a facial recognition application, which

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caused embarrassment in society. In another case, the AI error caused the death of a worker in an automobile factory. These cases point to doubts in relation to the responsibility for moral and criminal damage and in which legislation the action would be interpreted, which could be the Civil, Criminal and / or Customer Protection Code [10].

When human beings perform a communication process through language, they make use of an extremely complex process, without any effort, because the communication process happens between intelligent beings. In order for a computer to be able to understand natural communication, it is required no less than the human ability to contextualize and process, making a connection with the message to be transmitted back, and AI technology is fundamental to development of this type of system [33].

There are several possible definitions for AI as shown in Table 1.

Table. 1: Possible Definitions for Artificial Intelligence.

Author	Definition
John McCarthy, 1955	it is the science and engineering of making smart machines, especially smart computer programs
McCarthy; Hayes, 1969	a machine is intelligent if it is capable of solving a class of problems that require intelligence to be solved by human beings
Minsky, 1980	it is the science that allows machines to perform tasks that would require intelligence, if they were performed by humans
Feigenbaum; Barr, 1982	it is the part of computer science that comprises the design of computer systems that exhibit characteristics associated, when present in human behavior, with intelligence
Charniak& McDermott, 1985	it is the study of mental faculties through the use of computational models
Rock, Knight, 1994	the area of Computer Science oriented to understanding, building and validating intelligent systems, in other words, which exhibit, in some way, characteristics associated with what we call intelligence
Nikolopoulos, 1997	it is an area of computer studies that is interested in studying and creating systems that can exhibit intelligent behavior and perform complex tasks with a level of competence that is equivalent or superior to a human specialist
Russell, Norvig, 2009	it is the study of intelligent agents capable of realize their environment and carrying out actions with the expectation of selecting an action that maximizes performance
European Commission, 2020	refers to systems that exhibit intelligent behavior, analyzing their environment and taking actions - with some degree of autonomy - to achieve specific objectives
Santos, 2020	it is a part of computer science research that seeks, through computational symbols, to build mechanisms and / or devices that simulate the human being's ability to think, solve problems, which means, to be intelligent

Source: Own authorship (2020) based on [34, 35, 36, 37].

In Table 1, all the authors associate that to be AI, it has to solve problems with the same capacity that humans have to solve the issues, that means, it requires that it be done in an intelligent, autonomous way, besides having the ability to learn and replicate that learning.

The context for the study of AI is based on the following categories [17]:

- systems that act like human beings: The Turing Test is positioned in this context, because some questions are asked and during the process it is verified whether the machine is able to distinguish them as humans do, verifying its language processing capacity, knowledge representation, reasoning and learning. Example: robots;
- systems that think like human beings: with regard to “cognitive modeling”, which emerged in the 1960s with the aim of building accurate and observable theories about the way the human mind works. Example: artificial neural networks;
- systems that think rationally: based on the “laws of thought”, which is based on Aristotle's philosophy that

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tried to codify the correct reasoning, syllogism, using as a premise logic to solve any problem and write them in the form of notation, and;

- systems that act rationally: the approach is made by the "rational agent" where it is expected that the thing will be done correctly in order to achieve the objectives and have a rational behavior that does not necessarily involve logical reasoning. It covers all other systems.

The history of AI development between the 1940s and the 1970s is shown in Table 2.

Table. 2: History of AI Development Between the 1940s and the 1970s.

Period	Description
1940s	The mathematical model for artificial neurons was the first work related to AI and was done in 1943 by neuropsychologist McCulloch and logician Pitts; In 1949, Donald Hebb created the algorithm to modify the connection weights between neurons.
1950s	In 1951 Marvin Minsky and Dean Edmonds created the first neural network; In 1956 it was the first time that this name was given by John McCarthy at a meeting at Dartmouth College, in the presence of Marvin Minsky (Harvard), Nathaniel Rochester (IBM) and Claude Shannon (Bell Laboratories).
1960s	In the mid-1960s, the US Department of Defense provided funding for AI; Between 1952 and 1969 it was a period of great progress, much enthusiasm and high expectations, taking as an example the General Problem Solver system, GPS, which was designed by Ernest and Newell, in 1969.
1970s	In 1974 there was a progressive reduction in research, development was restricted to the academic environment and mathematical formalization.

Source: Own authorship (2020) based on [38, 39].

The Fig. 1 below represents the evolution of AI from the 1980s to 2018, it shows that in the early 1980s, there was a return to financing for projects aimed at the development of AI, which left the academic environment and entered the industrial segment. In 1986, neural networks returned. In 1987, this technology was discredited and there was a reduction in financing. In 1991 AI was used in the Gulf war. At the end of the 1990s, there was another positive wave, where AI began to be used in logistics, data mining, medical diagnosis, among others. In the 2000s, intelligent toys appeared [38, 39].

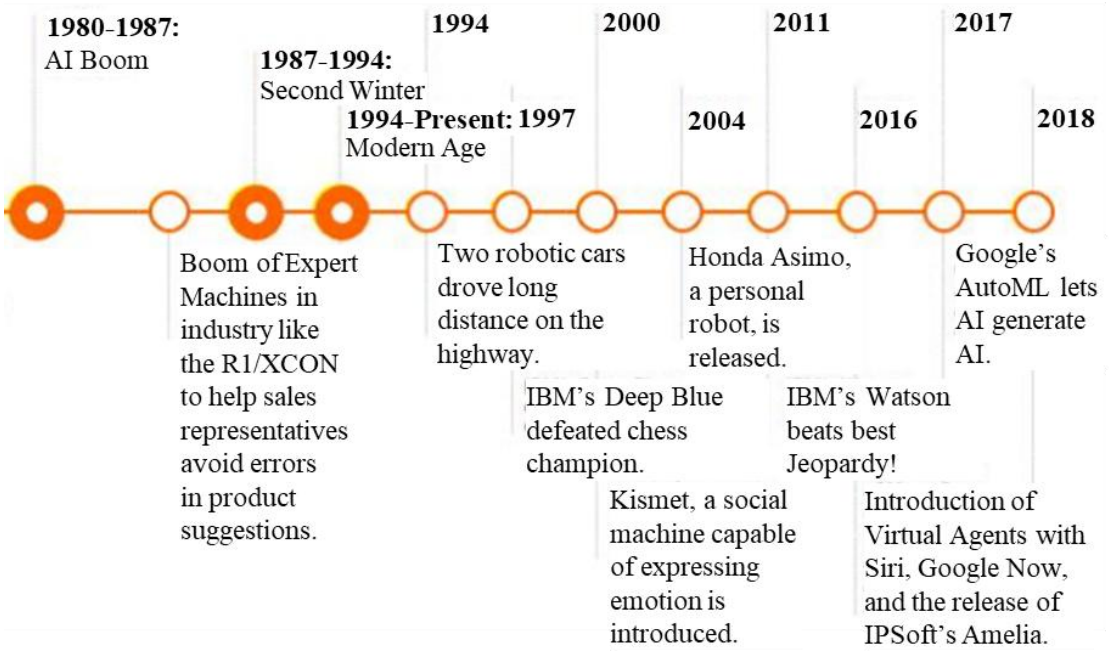

Fig. 1: Evolution of AI from the 1980s to the present day.

Source: [40]

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AI is related to several areas that were important for its structuring such as philosophy, biology, computing, communication, education, engineering, psychology and sociology [38].

The commercialization of AI became a reality in the period between 1980-1988, when companies had the need to reduce costs and one of the ways found was through specialist systems [38, 40].

3.4 COPYRIGHT

The Brazilian Law number 9,610 of 1998 in its 1st Article establishes as copyright, "the rights of author and those related to them", with copyright being the literary, artistic and scientific creations, called "intellectual works", which are described in its 7th Article, assuring its authors, among them: writers, composers, photographers, painters, among others, as well as those who are connected to them: artists, interpreters, performers, among others, the moral and patrimonial right to use it, in the form of the law. In the scope of copyright, the following segments stand out: Copyright; Related Rights, and; Computer Program [6].

Copyright is a premise that aims to protect the work made by an artist, avoiding its misuse. Copyright belongs to the Private Law branch whose objective is to regulate the relations originating from the legal field, related to the creation of intellectual works and their economic content. The works can be literary, artistic and / or scientific, among others. Protections can be of two types: Moral Law and Property Law. Moral Law creates a link between the work and its creator while it exists in life, it cannot be commercialized, being inalienable and imprescriptible. On the other hand, Patrimonial Law refers to the economic / pecuniary use of the work, its usufruct and means of transfer, that means, it is linked to the ownership of the work and allows the recovery of the invested capital. For a creation to be protected, the work must be a product designed by the human talent or intellect of its creator and be original. The property of creation has the transmissible character because the right can be passed onto the heirs [6, 41, 42].

The author is an individual, as determined by the 11th Article of Law number 9.610 of 1998, who identifies himself as the creator of the work. It is also allowed by law to be a legal person, adding your name or something characteristic that can be identified as the author [43]. Author is the subject "who unites, in modern language, inspiration (idea) with a good deal of perspiration (work) in the physical and mental effort to produce the corporeal basis of his intellectual creation. Without work there is no protected intellectual authorship" [44].

The legislation lists several items that are considered as production of the human intellect such as the works of drawing, painting, printmaking, sculpture, lithography, kinetic art, among others. Computer programs, despite having specific legislation, is on the list of a literary work [6, 42].

Copyright considers that only the individual has the ability to create, as the individual is normally an inventive and creative being, and that this ability could not be realized by any other means than through human beings. The law was enacted in 1998, and at that time, AI was not yet well developed and lawmakers could not contemplate other forms of creation [6, 42].

In the case of AI, the protection given is to the software, which is related to the computer program, whose term is 50 years, counting from the first day of the year following its publication. There is no obligation to register in Brazil [42].

Computer programs are: "the organized set of instructions necessary for the operation of automatic information processing machines [...].", concept applicable to AI [11, p. 67].

Regarding copyright, Chapter I, Section 9 of English legislation reads as follows: "In the case of a computer-generated literary, dramatic, musical or artistic work, the author must be considered the person by whom the necessary steps are taken to create the work", therefore, this interpretation of the law regarding the ownership of the artistic work is not a specific Brazilian case [45].

Regarding English legislation, Section 12 says the following: "If the work is computer generated, [...] the copyright expires at the end of the 50-year period from the end of the calendar year in which the work was done" [45].

Academics and the United States Copyright Department (USA) mentioned that computer programs cannot own copyright because software does not have legal ownership and this condition does not allow them to be proprietary of goods and only the programmer, the user, both or no one can hold that possession condition over propriety. They understand that the programmer has rights, because they are outsourced and do not have formal employment with those who hire him to carry out the programming and only relate to the computer program. Regarding shared law, the understanding is that both are necessary to create the work that will be generated by AI [46].

The European Union, Australia and the USA have already positioned themselves in several opportunities that copyright protection is only restricted to human creation,

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therefore, this vacuum is not exclusive to Brazilian legislation only. The variety of creation made by AI is independent of human intervention, but it is inspired by a database that already exists in its memory and that was fed by a human being, because it is an autonomous system and without predictability of results, and this situation is totally contrary to what determines the 7th Article, of being works of creation of the spirit and presenting traces of creativity [47].

IV. DISCUSSION AND RESULTS

Since 1999, the growth of the internet in the world has occurred and in parallel the development of AI as a tool to help network users. When the law was published, AI was not yet at the level of commercialization and legislators were not knowing how far this technology would evolve and under what conditions its use would occur, therefore, the law aimed at protecting works conceived by the spiritual creation of the author and authored by individuals. The future has come at a great speed and it imposes itself on the existing and prior norms to its conception and placing on the market for the benefit of humanity.

AI-based systems are used in the most varied fields of knowledge, which results in several products, from the medical field to the cinematographic studios, passing through the field of literature and the arts.

AI generates an impact in the different branches of law and more specifically in Copyright Law, because the current legislation in the world is prior to the advance of the technological development of AI, which considered only the human being capable of creating a work of art, as it understands that the individual was the only one with reasoning capacity. With the dissemination of its use aimed at artistic creation, there is a gap in relation to the protection of the work generated by AI, as there is no basis for solving this problem, especially by WIPO, which constitutes the highest institution related to IP. The case of the work of art called “The Next Rembrandt” was what motivated the discussion in the academic and legal circles about the ownership of the authorship of the painting, which makes the issue emblematic.

The process of advancing AI over the artistic environment is also already a reality, artistic works have been built through the application of this technology, causing questions about the ownership of intellectual property and copyright.

The issues related to the protection of the copyright of non-human creation, did not start in this specific case, because there was already a concern about works made by computer, which is a tool that every day becomes an ally of human beings and helps them to solve complex problems, therefore, the works generated by the computer are not protected under the laws currently in force in the world, since it is not the result of human intellect. Neither the legislation covers copying of protected work that is used as AI data entry.

From the studies realized until now, it is observed that the global legislation has not yet been updated to resolve the doubts regarding authorship and responsibility originated from the action of AI, in order to clarify who is responsible for commercial exploitation, for the violation of rights of others and other types of liability for other damages, in addition to other infractions that happen to be committed by the AI, which creates a legal uncertainty. Thus, there is no legal basis for recognizing authorship of the works produced by AI, as well as the ownership of the subject of the work.

In the creations made by AI there is no physical effort to carry out the work of ideation and creation of an art that is characterized as something that originates from the intellect and that makes a link between the author and the work. It is also noticed that the origin of the work does not come from the spirit of the author. The level of involvement and control does not belong to the human being, as in photographic records, but exclusively to the machine.

The 45th Article of Brazilian Law number 9,610 of 1998 determines that works of unknown authorship belong to the public domain, it is possible to insert in this article the creations made by AI, that do not fit the existing legislation or do not have legal precedent. The 12th Article of this law determines that the creation has an identification that can attest to the authorship of the work, which can be the real name, a pseudonym or a brand or character, which does not happen with AI [6].

The work done by the AI will have two categories related to the ownership of the work created, one being the creator who will be the individual who owns the copyright and the other the owner of the work whose link is associated with ownership and economic rights and not always is related to the creation of the work or the creative process of the work.

There are some already famous cases on the internet, such as Microsoft's AI software, sponsored by the Dutch bank ING - recognized as an innovative financial institution - that after studying the Dutch artist Rembrandt's artistic works, produced a new “original”

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Work, a painting which expresses all the characteristics of the painter and which is shown in Fig. 2 a).

For AI studies, 346 works by the painter Rembrandt were used, which were digitized in high resolution, storing 150 gigabytes of digitally rendered graphic data, the result of a digital analysis from pixel to pixel. Machine learning of the geometric patterns common in Rembrandt's works allows the generation of an algorithm based on facial identification technology. As a final result, after the creation of 168,263 fragments of paintings from the 346 works, the final painting was done by the AI using a 3D printer to better represent "the map of heat, texture and thickness of the layers that an authentic Rembrandt would have" [48]. The "original" final work has since challenged and surprised experts on the subject as can be seen in Fig. 2 a). The new work was entitled "The Next Rembrandt".

Fig. 2: a) Illustration of the final work The Next Rembrandt produced using Microsoft AI. b) Self-portrait made by the painter at the age of 34 (1640).

Source: [49, 50].

The paintings shown in Figure 2 have similarities, as they are self-portraits painted in light gray, with shadows on one side of the face and in the background, they are figures that look mirrored, where the screen is best seen from afar and generates feeling of depth, the face lines are distinct and characterize a character thinking and with a serious face [1], therefore, the painting shown in Figure 2 a), made by the AI, could be inserted in the works produced by Rembrandt.

The result shows that the learning done by the machine resulted in a work done autonomously by the AI and that did not have human interference, with the characteristics of Rembrandt's work, with the operations being carried out using the algorithms employed and that it would not be possible to be used by a human being, where all the characteristics and other pertinent elements of his work were inserted, resulting in a work related to the one he would have produced.

The atmosphere created in the work, reproducing one of the characters already portrayed, using precision in the brush strokes, creating an environment composed of shadows and light, which are perceived in Rembrandt's original works.

Rembrandt's works are already in the public domain and, therefore, could be used by AI as a field of study and this condition does not violate copyright protection legislation. The authorship of the work is still debatable, due to outdated legislation in a global way for this problem, which constitutes a field of questioning and studies on copyright, since AI has no personality, whether it is equivalent to the person individual or legal entity, or another name, so that the work can be individualized and its author can be properly identified. This condition provokes heated debates with some currents considering the attribution of authorship to a machine as coherent and on the opposite side there is a current that holds the condition that the result of the product does not come from a spirit creation and therefore, the copyright cannot be attributed to a machine. A third current based on existing legislation and definitions argues that these works made by AI should be placed in the field referring to the public domain, since their actors would be in the field of indetermination or of unknown authors.

V. CONCLUSION

Technology is increasingly incorporated into the daily lives of humanity, being used in several areas. With technological advancement, its applications become viable and are increasingly considered.

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Nowadays, with technological advances, it is not possible to attribute only the human being the capacity of the intellect.

As with jobs, the creation of works by AI can inhibit human creation, since the individual will not have a great power to compete with a machine.

Resolving who owns the copyright will generate a situation of reliability at the time of the negotiation between the seller and the buyer, in addition to creating a scenario of certainty that the transaction has been made in accordance with the law. It will also serve to resolve doubts about authorship and the use of creations protected by intellectual property to generate new works. In addition, it will serve as a parameter for a new creation and how these issues will be resolved within the scope of justice, consequently not remaining a legal uncertainty.

Legislation is a dynamic tool, but its speed of reaction is very slow in relation to the rate of growth of the technology. The legislation on authorship of creation by machine must be updated so that someone can be held responsible for any errors, for economic and patrimonial exploitation, according to the specific rules and legislation of each case, so that there are mechanisms and legal instruments for resolving doubts, generating legal certainty and minimizing conflicts.

Existing legislation should define in the near future about the ownership of the works made by AI, one that the winning chain is believed to be the one that establishes its insertion as “public domain”, from its generation, which will raise the impediment of commercial exploitation of the work by technology companies, which already have a financial gain linked to market exploitation during their public exposure. There is also a gain on the software through the use license, when it is used by third parties.

The current legislation indicates that intellectual property is linked to human inventiveness. Therefore, the possibility of IP being attributed to an AI leads the case presented, “The Next Rembrandt” to great uncertainties given the inexistence of jurisprudence that differs from the current legislation and the inexistence of international legislation that points to the other directions in the future. Thinking about new and original artistic productions through AI and thinking about arguing about the possibility of attributing the title of these works to an AI is entering a sea of uncertainties, without a horizon that points to a legal or jurisprudential support that justifies a certain argument, which, later on, would result in a loss of cause.

Technological advances are contributing to an acceleration in the field of AI and this condition is not accompanied by the legislation of most countries, and these countries have not yet established a doctrine regarding the copyright of works made by the machine, which demonstrates that this field is not fast in its fundamentals and takes a long time to answer society, which causes legal uncertainty and the citizen expects justice to be faster in responding to their demands, which can be done even with the use of AI, indeed.

The scope and speed of technological evolution is much greater than the capacity for legislative progress. The legislator should look for ways to keep legislation less backward and with the capacity to define issues related to technology, especially in relation to IP ownership resulting from the creation made by an AI, in a way that brings security to the legal system.

As long as there is no legislative update, the solution will be based on the study between the parties involved in the achievement of the works made through AI and the attribution of copyright over those involved in a given phase.

As with human creation, the one performed by AI is the result of previous works lived and learned over time, having its entire creative process influenced by the experience and contact with other works.

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